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U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE  
**WATER SUPPLY OUTLOOK**  
**FOR**  
**MONTANA**

and  
FEDERAL · STATE · PRIVATE COOPERATIVE SNOW SURVEYS  
Collaborating with  
MONTANA AGRICULTURAL EXPERIMENT STATION

AS OF  
**JUNE 1, 1981**



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## STATEWIDE OUTLOOK

### MOUNTAIN SNOWPACK

Precipitation for the last half of May has been near or above average in most mountain areas. The high elevation snowpack is still below average in all areas.

Most of the precipitation that fell over the past two weeks was rain. Some cool storms near mid-month did drop snow in southern Montana. The melt rates for the last half of May were somewhat less than normal for this time of year. The present snowpack in the high elevations varies from 70 to 85 percent of average in the Flathead River Drainage and along the Divide between Butte and Helena. Water content of the snow in the Bitterroot and Yellowstone River headwaters is still in the 30 to 50 percent range.

Precipitation amounts recorded at SNOTEL sites for the period from May 15-31 vary from about 2 inches to 6 inches. The area roughly encompassed by a line from Butte to Missoula to Great Falls to Bozeman received 3 to 5 inches with most of it coming from May 20-22.

Soils in most areas in central and southwest Montana are saturated from these rains and snowmelt. Much of the precipitation that falls in these areas in the next few weeks will become streamflow as soils cannot hold any significant amount of water until some drying occurs.

### STREAMFLOW FORECASTS

Rainfall during May has improved the water supply outlook over much of the state. Some areas have had record high peak flows. These include the East Gallatin River and its tributaries near Bozeman, nearly all streams with headwaters near the Continental Divide from Butte north to the Rogers Pass area, and some streams flowing northerly from the Big Belt and Little Belt Mountains.

The cool weather has slowed snowmelt rates but the snowpack levels still remain low.

The recent moisture has helped to delay the development of water shortages. However, unless June and July precipitation continues in the average or above average range, problems are still expected to occur on many drainages, particularly the Bitterroot and Yellowstone River systems.



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SOIL CONSERVATION SERVICE  
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## STORM OF MAY 19-23, 1981

The highest peak flow of record occurred on many streams in the East Gallatin, Upper Clark Fork, Boulder River, Ten Mile Creek, Prickly Pear Creek, Belt Creek and Smith River Drainages in central, west central and southwestern Montana.

Precipitation had been quite extensive over most of the western half of Montana from about May 8-12 and May 15-17. Temperatures were warm during the later storm and snow was melting in the mountains. Soils were nearing full capacity. Many areas started to receive additional moisture on the 19th and 20th with heavier amounts falling on the 21st. Precipitation started to taper off by the 22nd. As the soils became saturated, excess water began filling and overflowing stream channels.

Data from SNOTEL sites showed that some interesting and different conditions occurred during this storm. In many areas near the center of the storm, precipitation at foothill and lower elevations was greater than at higher elevations. This is apparently due to the warm moist weather system being uplifted by a colder weather system. Also, many areas that had snow in the 6000-8000 ft. elevation zone showed additional water being contributed from snowmelt.

The following preliminary data was obtained from SNOTEL sites in or near the major area affected by this storm:

LOCATION & DATA SITE	Eleva- tion (ft.)	Precip. (in.)	Snowmelt SWE (in.)	Increase in SWE (in.)	Net Impact to Runoff (in.)
GALLATIN RIVER DRAINAGE					
Bridger Bowl	7250	5.0	1.9		6.9
Lick Creek	6860	3.5	1.4		4.9
Maynard Creek	6210	4.0	2.2		6.2
Shower Falls	8100	2.5		0.4	2.1
CONTINENTAL DIVIDE - BUTTE TO ROGERS PASS					
Basin Creek	7180	2.7		0.2	2.2
Frohner Meadow	6480	4.4	2.8		7.2
Nevada Creek	6480	3.4	3.0		6.4
Rocker Peak	8000	3.0			3.0
ANACONDA - PHILIPSBURG AREA					
Barker Lakes	8250	2.6		0.8	1.8
Black Pine	7100	2.9	1.8		4.7
Combination	5600	2.7			2.7
Skalkaho Summit	7260	1.8	0.5		2.3
Warm Springs	7800	2.5	0.1		2.6
BLACKFOOT RIVER DRAINAGE					
Copper Bottom	5200	2.2			2.2
Copper Camp	6950	3.6	8.4		12.0
Lubrecht Flume	4680	1.9			1.9
North Fk. Elk Creek	6250	1.6			1.6
(Also see Nevada Creek under Continental Divide)					
CONTINENTAL DIVIDE - ROGERS PASS TO SUMMIT					
Badger Pass	6900	3.2	4.5		7.7
Mount Lockhart	6400	3.3	2.0		5.3
Pike Creek	5930	1.5	4.2		5.7
Waldron	5600	2.2			2.2
BIG BELT MOUNTAINS					
Boulder Mountain	7950	2.9	2.4		5.3
Pickfoot Creek	6650	3.0	1.0		4.0
LITTLE BELT MOUNTAINS					
Deadman Creek	6450	1.3			1.3
Spur Park	8100	2.3	2.5		4.8
SNOWY MOUNTAINS					
Crystal Lake	6100	3.4	3.3		6.7

The National Weather Service is responsible for obtaining precipitation data at climatological stations. The Geological Survey is responsible for streamflow measurements. Many other Federal, State, and private agencies also have data that would be helpful in documenting all the variables that are related to this event.



# SNOW SURVEY DATA

SNOW June 1, 1981						
DRAINAGE BASIN and/or SNOW COURSE						
NAME	Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Last Year	Average
ARCH FALLS	7350	5/28	6	2.2	1.7	10.2
BADGER PASS	6900	5/28	45	20.7	19.2	41.3
BADGER PASS PILLW	6900	5/28	SP	15.6	10.9	--
BANFIELD MOUNTAIN	5600	5/29	0	0	0	7.6
BANFIELD MOUNTAIN PILLW	5600	5/29	SP	0	0	4.2
BARKER LAKES PILLW	8250	6/01	SP	12.9	--	--
BASIN CREEK	7180	5/28	16	4.9	--	--
BASIN CREEK PILLW	7180	5/29	SP	9.7	--	--
BEACLE SPRINGS	8850	6/01	EST	0	3.0	--
BEACLE SPRINGS PILLW	8850	6/01	SP	0.2	2.7	--
BEAR PAN SKI AREA	5200	5/28	0	0	0	--
BIG CREEK	6750	5/27	77	39.0	28.5	44.3
BLACK PINE	7100	5/28	0	0	1.2	4.1
BLACK PINE PILLW	7100	5/28	SP	0	2.0	4.4
BLOODY DICK	7600	6/01	EST	0.0	0	--
BLOODY DICK PILLW	7600	6/01	SP	0.0	0.7	--
BLUE LAKE	5900	5/28	0	0.0	0	14.7
BOULDER MOUNTAIN	7950	6/01	EST	13.0	8.5	--
BOULDER MOUNTAIN PILLW	7950	6/01	SP	11.1	7.1	--
BOX CANYON	6670	6/01	EST	0.0	0	--
BOX CANYON PILLW	6670	6/01	SP	0.0	0	--
BOXELDER CREEK	5100	5/28	0	0.0	0	--
BRIDGER BOWL	7250	5/27	34	16.0	3.1	23.6
BRIDGER BOWL PILLW	7250	5/27	SP	15.0	2.6	19.8
CALVERT CREEK	6450	6/01	EST	0.0	0	--
CALVERT CREEK PILLW	6450	6/01	SP	0.0	0	0
CASHE CREEK	7800	6/01	EST	0.0	--	--
CASHE CREEK PILLW	7800	6/01	SP	0.0	--	--
CHICKEN CREEK	4060	5/28	0	0.0	0	--
CLOVER MEADOW	8800	6/01	EST	13.5	6.0	--
CLOVER MEADOW PILLW	8800	6/01	SP	12.7	5.7	--
COLE CREEK	7850	5/28	25	11.4	0	19.5
COLE CREEK PILLW	7850	5/28	SP	12.8	0	18.6
COMBINATION	5600	5/28	0	0.0	0	0
COMBINATION PILLW	5600	5/28	SP	0.0	0	0
COPPER BOTTOM	5200	6/01	EST	0.0	0	--
COPPER BOTTOM PILLW	5200	6/01	SP	0.0	0	0
COPPER CAMP	6950	6/01	EST	3.0	0.5	--
COPPER CAMP PILLW	6950	6/01	SP	3.4	1.0	19.1
CRYSTAL LAKE	6100	6/01	EST	0.0	0	--
CRYSTAL LAKE PILLW	6100	6/01	SP	0.0	0	--
DARKHORSE LAKE	8600	6/01	EST	22.0	--	--
DARKHORSE LAKE PILLW	8600	6/01	SP	20.3	--	--
DEADMAN CREEK	6450	5/29	0	0.0	0	4
DEADMAN CREEK PILLW	6450	5/29	SP	0.0	0	0
DEVILS SLIDE	8100	5/28	40	16.2	14.6	25.5
DIVIDE	7800	6/01	EST	0.0	1.0	--
DIVIDE PILLW	7800	6/01	SP	0.0	1.4	1.0
EMERY CREEK	4350	6/01	EST	0.0	--	--
EMERY CREEK PILLW	4350	6/01	SP	0.0	--	--
FATTY CREEK	5500	5/27	0	0.0	0	9.1

SNOW June 1, 1981						
DRAINAGE BASIN and/or SNOW COURSE						
NAME	Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Last Year	Average
NEZ PERCE CAMP	5580	6/01	EST	0.0	--	--
NEZ PERCE CAMP PILLW	5580	6/01	SP	0.0	--	--
NOISY BASIN	6040	6/01	EST	29.0	--	43.5
NOISY BASIN PILLW	6040	6/01	SP	24.0	--	31.3
NORTH FK. ELK CREEK	6250	6/01	EST	0.0	0	2.0
NORTH FK. ELK CREEK PILLW	6250	6/01	SP	0.0	2	1.6
NORTH FORK JOCKO	6330	5/28	44	20.4	5.5	29.5
NORTHEAST ENTRANCE	7400	6/02	0	0.0	--	7
NORTHEAST ENTRANCE PILLW	7400	6/02	SP	0.0	--	0
OPHIR PARK	7150	5/30	0	0.0	--	12.2
PETERSON MEADOWS	7200	6/01	0	0.0	6	1.8
PETERSON MEADOWS PILLW	7200	6/01	SP	1.7	1.3	2.7
PICKFOOT CREEK	6650	6/01	EST	0.0	0	--
PICKFOOT CREEK PILLW	6650	6/01	SP	0.0	0	--
PIKE CREEK	5930	6/01	EST	0.0	--	--
PIKE CREEK PILLW	5930	6/01	SP	0.0	--	--
PLACER BASIN PILLW	8830	6/01	SP	12.0	--	--
POORMAN CREEK	5100	5/29	0	0.0	0	11.9
POORMAN CREEK PILLW	5100	5/29	SP	0.0	0	10.3
PORCUPINE	6500	6/01	EST	0.0	0	--
PORCUPINE PILLW	6500	6/01	SP	0.0	0	--
RED MOUNTAIN	6000	6/02	0	0.0	0	5.4
RED TOP	5260	6/02	0	0.0	0	--
ROCKER PEAK	8000	6/01	22	8.8	5.0	10.5
ROCKER PEAK PILLW	8000	6/01	SP	16.3	11.6	15.4
ROCKY BOY	4700	5/28	0	0.0	0	0
ROCKY BOY PILLW	4700	5/28	SP	0.0	0	0
SADDLE MOUNTAIN	7940	6/01	EST	8.0	6.0	22.4
SADDLE MOUNTAIN PILLW	7940	6/01	SP	8.7	6.8	22.5
SHOWER FALLS	8100	5/28	46	19.8	17.1	29.8
SHOWER FALLS PILLW	8100	5/28	SP	19.3	13.1	26.2
SILVER RUN PILLW	6630	5/28	SP	4	0	--
SKALKAHU SUMMIT	7260	5/28	20	8.0	6.1	16.6
SKALKAHU SUMMIT PILLW	7260	6/01	SP	9.9	12.2	--
SKYLARK TRAIL	6200	6/01	EST	0.0	--	--
SKYLARK TRAIL PILLW	6200	6/01	SP	0.0	--	--
SPOTTED BEAR MOUNTAIN	7000	5/28	0	0.0	0	1.2
SPUR PARK	8000	5/29	31	12.6	3.0	18.8
SPUR PARK PILLW	8000	5/29	SP	14.1	2.9	18.2
STAHL PEAK	6050	5/29	47	25.0	9.4	35.8
STAHL PEAK PILLW	6050	5/29	SP	23.1	16.3	30.2
STRYKER BASIN	6180	5/28	34	17.6	2.6	--
STUART MOUNTAIN	7400	5/28	31	13.7	4.0	20.2
SUCKER CREEK	3960	5/28	0	0.0	0	--
TAYLOR ROAD	4080	5/28	0	0.0	0	--
TEPEE CREEK	8000	6/01	EST	0.0	5.8	11.9
TEPEE CREEK PILLW	8000	6/01	SP	0.0	4.4	5.3
TRINKUS LAKE	6100	5/28	45	23.2	2.8	27.0
TV MOUNTAIN	6800	5/28	7	2.4	3.3	11.3
TWELVENTH CREEK	5600	6/01	EST	0.0	0	2.6
TWELVENTH CREEK PILLW	5600	6/01	SP	0.0	0	9
TWIN CREEKS	3580	5/28	0	0.0	0	0
TWIN LAKES	6510	6/01	EST	10.5	20.0	30.7
TWIN LAKES PILLW	6510	6/01	SP	10.0	19.1	28.1
UPPER HOLLAND LAKE	6200	5/28	26	10.7	--	24.8
WALDRON	5600	6/01	EST	0.0	0	0
WALDRON PILLW	5600	6/01	SP	0.0	0	2

## CORRECTIONS (CONT'D)

SNOW						
DRAINAGE BASIN and/or SNOW COURSE						
NAME	Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Last Year	Average
MID-MARCH						
Heart Lake Trail	4800	3/15	21	8.1	--	--
Hoodoo Basin	6000	3/15	80	30.1	39.5	--
Hoodoo Creek	5900	3/15	72	26.2	36.7	--
Placer Basin	8830	3/16	41	11.5	--	--
APRIL						
Big Coulee	5100	4/10	16	5.1	--	8.3
Combination PILLW	5600	3/30	SP	3.0	5.3	6.6
Daisy Peak	7600	3/27	26	6.8	9.0	12.0
Highwood Divide	5650	4/10	20	6.4	--	10.6
Highwood Station	4600	4/10	21	6.5	--	4.6
Mill Creek	7500	4/02	33	7.4	14.0	14.8
Mineral Creek	4000	3/30	32	10.8	17.0	19.2
Sand Basin Lower	6485	4/09	33	11.0	--	--
South Fork Shields	8100	4/03	72	21.6	21.6	26.7
MID-APRIL						
Heart Lake Trail	4800	4/16	34	12.0	--	--
Hoodoo Basin	6000	4/16	108	46.3	--	--
Hoodoo Creek	5900	4/16	96	39.6	--	--
Pike Creek	5930	4/16	54	20.6	--	--
MAY						
Darkhorse Lake PILLW	8600	5/03	SP	20.4	--	--
Friday Hill	4620	5/04	1	6	2.8	--
Hoodoo Basin PILLW	6000	5/04	SP	32.7	35.7	52.8
Lenhi Ridge PILLW	8100	5/03	SP	5.5	6.7	10.2
Marias Pass	5250	5/03	9	3.0	7.6	17.8
Mineral Creek	4000	4/30	14	5.2	6.4	14.2
Pickett Pin D	9450	4/30	45	16.5A	26.0	32.4
Red Top	5260	5/04	44	19.6	9.6	--
MID-MAY						
Fourth of July	3450	5/15	0	0	0	--
Friday Hill	4620	5/15	0	0	0	--
Newton Mountain	5600	5/15	56	24.6	14.0	--
North Fork Jocko	6330	5/18	64	28.2	18.6	43.9
Red Top	5260	5/15	32	14.9	7.1	--
Stuart Mountain	7400	5/18	55	22.4	10.9	29.2
TV Mountain	6800	5/18	27	10.2	2.0	18.9
Upper Holland Lake	6200	5/18	40	17.3	10.7	33.8

## SATELLITE SNOW COVER



## MISSOURI RIVER BASIN

Above Canyon Ferry Dam

May 28, 1981  
14 percent snow cover  
8220' Average Snowline Elevation

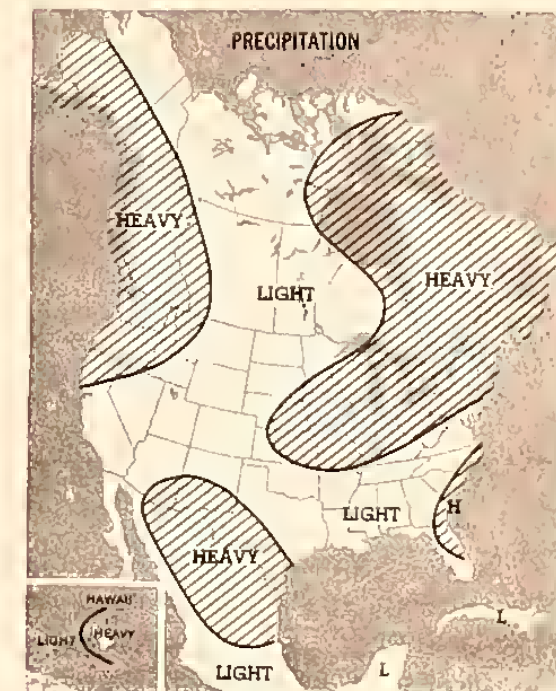
DATA PROVIDED BY NOAA/NESS



## average monthly weather outlook

## WEATHER PATTERNS CHANGING?

The predominance of a high pressure ridge over Montana that provided below average winter snowfall has changed during May. With weather conditions appearing to be three to four weeks ahead of normal, this could be the June rains that are occurring in May. Or, it could be a change in the weather patterns, that is, moving from a below normal moisture pattern to an average or above average pattern. At this time, no one seems to know what the future holds. The National Weather Service is projecting near normal temperatures for the western half of Montana and above normal for the eastern half. The precipitation outlook is for heavy amounts in the northwest corner and light amounts over the remainder of the state.



PROVIDED BY NOAA/NWS

## AGENCIES AND ORGANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

GOVERNMENT AGENCIES	
Canada	Department of the Environment Atmospheric Environment Service Water Management Service British Columbia Ministry of Environment Inventory and Engineering Branch, Hydrology Section Alberta Environment Technical Services Division
Federal	Department of the Army - Corps of Engineers Department of Agriculture - Forest Service Department of Commerce - Soil Conservation Service National Environmental Satellite Service National Weather Service Department of Interior - Bureau of Indian Affairs Fish and Wildlife Service Geological Survey National Park Service Department of Energy - Water and Power Resources Service Bonneville Power Administration
STATE AGENCIES	
Montana Conservation Districts	
Montana Department of Fish, Wildlife and Parks	
Montana Department of Natural Resources and Conservation	
Montana State University - Agricultural Experiment Station	
University of Montana - School of Forestry	
PRIVATE ORGANIZATIONS	
The Anschutz Company	
Big Sky of Montana	
Butte Water Company	
Flathead Valley Community College	
Montana Power Company	
Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.	

## RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH May 31, 1981

DRAINAGE BASIN	RESERVOIR	USUAL CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
COLUMBIA					
Kootenai	Kootenai	5,694.0	4,233.0	4,692.0	--
Flathead	Hungry Horae	3,428.0	3,317.0	3,226.0	2,523.0
	Flathead Lake	1,791.0	1,605.0	1,673.0	1,440.0
	Canas (4)	45.2	33.6	28.0	30.8
	Mission Valley (8)	100.3	97.2	103.5	59.4
Clark Fork	Georgetown Lake	31.0	31.0	29.1	25.8
	Laver Willow Creek	4.9	5.0	--	4.1
	Nevada Creek	12.6	--	13.0	10.9
	Noxon Rapids	334.6	321.0	330.6	257.0
Bitterroot	Painted Rocks	31.7	--	--	29.4
	Como	34.9	--	--	26.3
MISSOURI					
Beaverhead	Lima	84.0	80.0	54.8	68.1
	Clark Canyon	257.2	194.6	183.4	159.0
Ruby	Ruby	38.8	--	40.4	38.2
Madison	Hebgen Lake	377.5	371.6	350.9	300.3
	Ennis Lake	41.0	33.4	37.1	35.3
Gallatin	Middle Creek	8.0	7.6	7.3	6.5
Missouri	Canyon Ferry	2,043.0	2,010.0	1,981.0	1,625.0
	Hausser & Helena	61.9	60.1	62.5	60.0
	Lake Helena	10.4	9.8	10.7	9.8
	Holter Lake	81.9	79.1	81.0	77.0
	Fort Peck Lake	18,910.0	15,740.0	16,000.0	16,240.0
Smith	Smith River	10.6	11.4	10.0	10.9
	Newlan Creek	12.4	11.8	9.1	--
Nusselschell	Bair	7.0	6.8	6.8	6.7
	Matinadale	23.1	23.3	21.5	18.1
	Osgoodman's Basin	72.2	--	--	59.1
Sun	Gibson	99.0	97.5	94.8	90.6
	Willow Creek	32.2	30.2	30.5	28.3
	Pishkun	32.0	30.9	31.1	30.3
Marias	Laver Two Medicine	11.9	--	--	12.9
	Four Horns	19.2	--	--	12.9
	Swift	30.0	29.8	30.3	25.0
	Lake Frances	111.9	104.5	90.5	87.0
Milk	Elwell (Tiber)	1,347.0	652.9	654.5	642.7
	Beaver Creek	3.5	--	2.7	3.1
	Fresno	127.2	81.1	78.0	100.6
	Nelson	66.8	28.6	29.7	46.6
HUDSON BAY					
St. Mary's	Lake Sherburne	66.2	42.2	44.4	31.2
YELLOWSTONE					
Stillwater	Mystic Lake	21.0	7.9	10.0	5.4
Clark's Fork	Cooney	27.4	21.3	19.1	19.4
Tongue	Tongue River	68.0	--	--	47.8
Bighorn	Bighorn Lake	1,356.0	985.6	867.6	635.7







# SNOW PILLOW DATA

